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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/376,063	08/17/1999	SEIJI ANDOH	OKI-226	5971

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EXAMINER	
DATSKOVSKIY, MICHAEL V	
ART UNIT	**PAPER NUMBER**
2835	

DATE MAILED: 10/22/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/376,063	ANDOH, SEIJI	
	Examiner	Art Unit	
	Michael V Datskovskiy	2835	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on *30 September 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *20,22,24-29 and 31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) *20, 22, 24-29 and 31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Response to Arguments

1. Applicant's arguments, see remarks, filed 09/30/2003, with respect to the rejection under 35 USC §112, second paragraph have been fully considered and are persuasive. The rejection of the claims 26 and 28 under 35 USC §112, second paragraph has been withdrawn.

However, applicant's new admission, that: "...in this case, a person of ordinary skill in the art could readily determine what spacing, or range of spacings, of the bumps in the first bump unit would be sufficiently close such that the bumps would fuse into a unitary body upon application of the heat treatment" (page 2, lines 17-20), allows examiner to issue the Final rejection, based on this admission and the following assumptions:

First – applicant claims a semiconductor device having a plurality of separate solder bumps either in the signal peripheral area or in the heat transferring central area, and does not claim a unitary heat transferring body as a part of the claimed structure, but merely as a goal, which could be achieved by using its specifics. Although Katchmar discloses a possibility of having a unitary body in a central heat transferring area in the structure substantially similar to the one claimed by the applicant, because of the applicant's new admission examiner no more sees necessity to use reference by Katchmar for the rejection of the instant application;

Second – method of making a heat transferring solder unitary body coupled to the substrate of the semiconductor device cannot be claimed as a part of the structural

("apparatus") patent application, but rather should be an object of another patent application directed to technological methods;

Third – one of the major problems of making a solder ball (bump) connection is to avoid a shorting between them during a reflow process. In order to avoid such shorting, it is well known in the art to manipulate sizes of the balls and/or the distances between them, as well as using special solder masks or other methods. Therefore, manipulating of sizes of the balls and/or of the distances between them in order to achieve such shorting is inherently also known in the art;

Fourth – because all given by the applicant data and explanations, either in the specification or in the following communications, about sizes of the bumps or different spacing between them in the single area (central or peripheral) as well as between these areas, are directed to the goals of achieving said shorting or avoiding it, examiner came to the conclusion, that, based on the applicant's new admission, a person of ordinary skill in the art could readily determine what spacing, or range of spacings, of the bumps in the first bump unit would be sufficiently close such that the bumps would fuse into a unitary body upon application of the heat treatment, or what spacing, or range of spacings, of the bumps in the central and peripheral units or between them would be sufficient to avoid the shorting upon application of the heat treatment (reflowing);

Fifth –examiner insists that Bond et al do[redacted] teach a distinct heat transferring first bump unit area by describing it as located beneath the conductive slag 12 (col.4, lines 34-37), as opposed to the second, peripheral bump unit.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 20, 22, 24-29 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bond et al.

Bond et al teach a semiconductor device 8, figs 1-6, comprising: a substrate 14 having a main surface and a back surface, wherein said back surface has a central area, a distinct intermediate area surrounding said central area and a peripheral area surrounding said intermediate area; a semiconductor chip 10 formed on said main surface; a first bump unit formed of solder bumps 18 disposed at a first distance apart from each other, and located in the distinct area beneath a thermally conductive slag 12 in said central area of said back surface, wherein said first bump unit radiates heat from said semiconductor device; a second bump unit formed of solder bumps 18 disposed at a second distance apart from each other and located in said peripheral area of said back surface, wherein said second bump unit transmits signals, wherein the second bump unit is greater in quantity of solder balls that the first bump unit, said solder balls are spherical in shape. Regarding to the statement that the second distance is greater than the first distance, the second distance is less than a width of the intermediate area, and bumps of the first (central) bump unit being located sufficiently close to each other,

that upon the application of the heat treatment to the device, they will inherently fuse into a unitary body (claims 20, 22, 24-29); and to the statement that the first distance being about 1 to 1.4 times the diameter of the bumps of the first bump unit, and the second distance being about 1.6 to 1.7 times the diameter of the bumps of the second bump unit (claim 31): It would have been obvious to one skilled in the art at the time invention was made to employ a distinct intermediate area between the first and second groups of solder balls, the second distance being less than a width of the intermediate area, and to locate bumps of the first bump unit so closed to each other that upon the application of the heat treatment to the device, the bumps of the first bump unit will fuse into a unitary body, or to make the first distance about 1 to 1.4 times the diameter of the bumps of the first bump unit, and the second distance about 1.6 to 1.7 times the diameter of the bumps of the second bump in the device by Bond et al in order to avoid shortening between thermal and signal solder balls or to melt said thermal solder balls in a unitary bode, while applying a heat, since such a modification would have involved a mere change in the sizes of a components or a mere change in the ranges of said sizes. A change in size is generally recognized as being within the level of ordinary skill in the art. *In re Rose*, 105 USPQ 237 (CCPA 1955); or it would have been obvious to one having ordinary skill in the art at the time the invention was made, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233. Applicant has not shown that these particular sizes or ranges of sizes are critical by showing that the claimed range achieves unexpected results relative

to the prior art range. (In re Woodruff, 919 F. 2d 1575, 16 USPQ2d 1934, Fed. Cir. 1990). To establish unexpected results over a claimed range, applicant should compare a sufficient number of tests both inside and outside the claimed range to show the criticality of the claimed range. (In re Hill, 128 USPQ 197 CCPA 1960).

Conclusion

4. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Datskovsky whose telephone number is (703) 306-4535. The examiner can normally be reached on Mn - Fry 8 - 4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Darren E. Schuberg can be reached on (703) 308-4815. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Primary Examiner
Michael Datskovsky
October 17, 2003